



National Aeronautics and  
Space Administration  
**Lyndon B. Johnson Space Center**  
Houston, Texas



## Team training

The STS-79 astronauts spend many hours preparing for their mission. Photos on Page 3.



## Earned value

Mission Operations Directorate's contractors earn Certificates of Validation. Photos on Page 4.

# Space News Roundup

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## Galileo finds changes on Jupiter's moon

A new image of Jupiter's volcanically active moon Io, returned by NASA's Galileo spacecraft, shows that significant changes have occurred on the moon since Io was observed 17 years ago by the exploratory NASA spacecraft Voyagers 1 and 2.

"The changes we are seeing on Io are dramatic," said Galileo camera team leader Michael Belton of the National Optical Astronomical Observatories in Tucson, Ariz. Io's landscape undergoes constant change due to numerous sulfur volcanoes that continually erupt across its mottled orange and white face, he said. "The colors of material on the ground and their distribution have changed substantially since the Voyager fly-

bys of 1979."

One of the most striking changes noted in the image are new deposits of sulfur and sulfur dioxide frost deposited from the volcano Masubi in Io's southern hemisphere. "The sulfur dioxide gas that drives the volcano makes a big plume, condenses, then paints the surface white," Belton said. Masubi was discovered as an active volcano during the Voyager encounters of Io.

Galileo's first color image of Io was taken June 25 at a range of 1.4 million miles during the spacecraft's approach to Jupiter's largest moon, Ganymede. The smallest features that can be discerned in the new image of Io are approximately 14 miles in

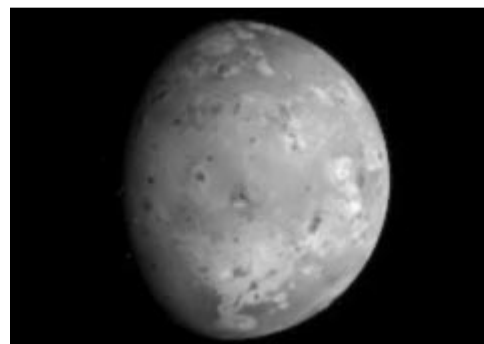
size, a resolution comparable to the best Voyager images of the same face of Io.

Galileo promises to return new views of volcanic activity on Io throughout the spacecraft's remaining 17-month mission orbiting Jupiter. Higher resolution images of Io will be taken in coming months.

Launched in October 1989, Galileo entered orbit around Jupiter on Dec. 7, 1995. The spacecraft's mission is to conduct detailed studies of the giant planet, its largest moons and the Jovian magnetic environment.

More information on the Galileo mission is available on line at URL:

<http://www.jpl.nasa.gov/galileo>



NASA Photo

**The mottled face of Jupiter's volcanically active moon Io, viewed by the camera onboard NASA's Galileo spacecraft, shows dramatic changes since it was seen 17 years ago by the exploratory NASA spacecraft Voyagers 1 and 2.**

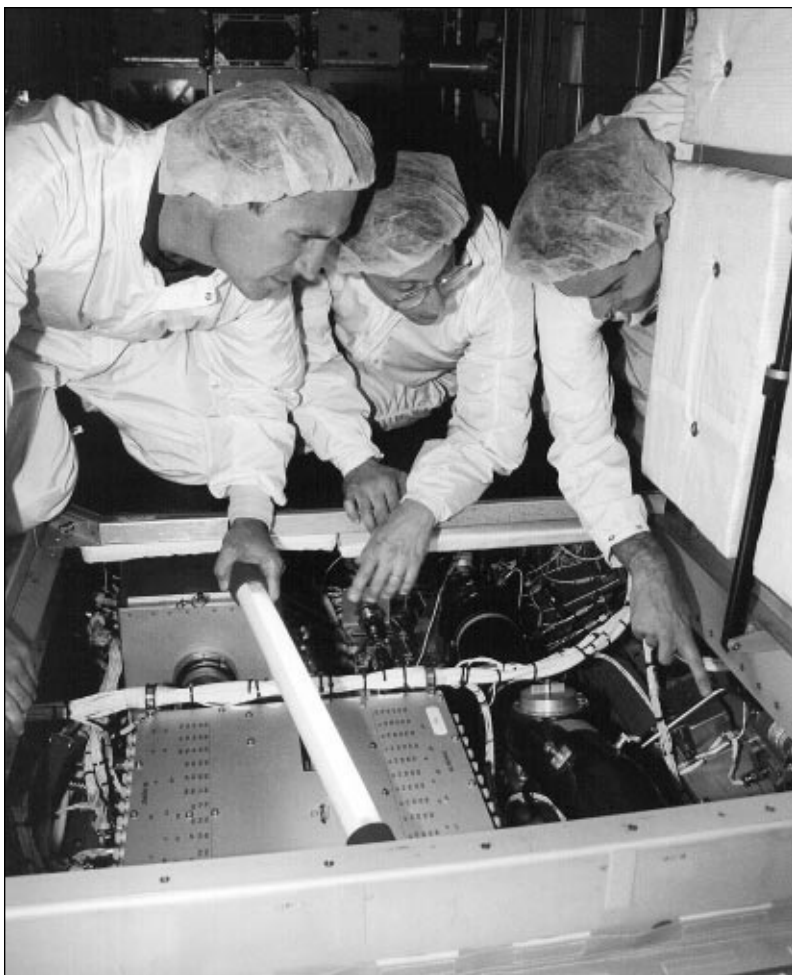
## Chamber team shares memories

The four JSC volunteers who spent 30 days sealed in a special, air-tight chamber in Bldg. 7 as part of the Advanced Life Support Early Human Testing Initiative will share memories with employees, family and friends Wednesday in Teague Auditorium.

Test Team Lead Doug Ming, Lead Engineer John Lewis, Lead Electrician Pat O'Rear and Thermal Systems Expert Katy Hurlbert will discuss living inside the three-story 20-foot diameter chamber recycling air and water during their stay. Two additional tests are planned for 1997, a 60-day and 90-day test, with the latter using both plants and physiochemical means for recycling air and water.

In addition to the briefing by the crew, JSC Director George Abbey and Engineering Director Leonard Nicholson will recognize key individuals and groups who contributed to the success of the Regenerative Life Support Program and discuss future plans for extended duration testing.

The invitation is being broadened to include not only JSC employees, but their friends and family members and off-site contractors and their guests. Visitors are encouraged to use JSC Gate 2 (in front of Bldg. 1 off of NASA Road 1).



NASA Photo

**From left, STS-79 Mission Specialists Carl Walz and Jay Apt check out the layout of the double Spacehab module with Chris Jaskola of McDonnell Douglas. The double module configuration will be flown for the first time on STS-79, allowing for more room for experiments and supplies for the Russian Mir Space Station. This is one of the many training requirements the astronauts perform before a mission. For more details see page 3.**

## Atlantis awaits new solid rocket boosters in VAB

The change out of *Atlantis'* solid rocket boosters continues to go smoothly as engineers prepare to mate the orbiter in the next few weeks.

*Atlantis* remains in the Vehicle Assembly Bldg. at Kennedy Space Center and engineers completed leak checks and joint close-out work on the new left booster mid-week. Work began Wednesday to stack the right booster segments. Booster stacking operations are expected to be completed Monday and engineers will then begin work to mate the boosters to the external tank Tuesday. On Wednesday, technicians will demate *Atlantis'* boosters to prepare the orbiter for its new set of boosters.

*Atlantis* is scheduled to roll from the VAB to the Orbiter Processing Facility Aug. 13 to await the completion of the mating of the boosters to the external tank. The orbiter will then roll back to the VAB to be mated with the new set of boosters

and external tank.

Roll out to KSC's Launch Pad 39A is scheduled for Aug. 20 and a final dress rehearsal of the launch countdown with Commander Bill Readdy, Pilot Terry Wilcutt, Mission Specialists Tom Akers, Jay Apt, Carl Walz and John Blaha is scheduled for Aug. 27 and 28.

The tentative launch date of Sept. 12 is set for the fourth docking to the Russian Mir Space Station. The nine-day mission will retrieve Astronaut Shannon Lucid from Mir and drop off Blaha who will begin a four-month stay on the Russian outpost. Blaha will join the Mir 22 crew—Commander Gennady Manakov, Flight Engineer Pavel Vinogradov and French Cosmonaut Researcher Claudie Andre-Deschays.

During the mission, *Atlantis'* astronauts and the Mir cosmonauts will focus on a variety of microgravity and life science experiments in the Spacehab double module—the first

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## Lucid writes home about space walking protocol

(Editors note: *Mir 21 Cosmonaut Researcher Shannon Lucid recently sent a letter home from the Russian Mir Space Station as the crew begins to wrap up its science work in anticipation of the journey home to Earth. The following is the text of her letter.*)

Dear Everybody,

Another week, another EVA—or at least that is what it seems like right now here on the space station Mir. Yuri and Yuri have just finished their fourth EVA in less than three weeks and are busy at this very moment getting ready for their fifth. There may even be a sixth. Even by Russian standards, that is a lot. Their fourth EVA was done on their 100th day in space. In answer to your question, no, it is not a routine, business as usual activity; there is a very real sense of anticipation that steadily increases as the EVA time approaches and peaks during the actual event. We have, though, established a certain working pattern preparing for these EVAs.

Several days in advance, Yuri and Yuri check out their spacesuits. Spacesuits are left here on Mir and used over and over; each crew person adjusts the size to fit himself. When a problem develops that can't be repaired by a crew person, the suit is replaced. The suit that Yuri is currently using has been used for more than 13 EVAs. After

the suits are checked out, any changes in wiring or telemetry are made. If Yuri and Yuri are taking a payload out, it is positioned in the airlock. Yuri and Yuri then spend some time looking over procedures and discussing, what they will be doing. Then, they gather together all the tools they'll be using and fasten them onto their tool tray.

Because of our current orbits, we don't have much communication coverage during our day, so all the EVAs have been done in the middle of the night. On the day of an EVA, we get up a little later than usual. After breakfast, Yuri and Yuri check their spacesuits again and the ground looks at telemetry to make certain that everything is in good shape. We have a quick lunch and then a rest period. And yes, we really do fall asleep; when the lights are turned off in a module, it is really dark and you just go to sleep.

After getting up, we wait until time to go out the hatch. Yuri and Yuri put on their white undergarments that have tubes sewn in the body, the head and the upper legs and arms. These tubes are for circulating water to cool the cosmonauts while they are doing the EVA. At this point in time there is very little communication capability with mission control,

so we are pretty much on our own. Just before time to enter the hatch, Yuri takes a big piece of red tape and puts it across the communication controls that I am absolutely not to touch while they are outside. He did this for the first EVA and the tape has now become a "tradition" that signals it is time to leave. I think that if I were the commander leaving a foreigner in my spacecraft all alone, I would wrap the entire place up in red tape.

The Russians have a tradition of everyone sitting quietly and collecting their thoughts before they begin a trip or start a new activity. That is what we do just before they leave for the airlock. We sit quietly together for a few minutes in the base block. Then Yuri says let's go, and both Yuris fly, literally, over my head like two white geese headed south.

They exit the base block with a wave and they are off to the airlock. A few minutes later, I hear the airlock clang shut, and there I am, all alone in the space station.

Communication is very good between the crew people here on Mir, so I hear all the preparations that are going on as they are getting the airlock ready for depressurization. Every once in a while, they will ask me what the station pressure is, what part of the world

we are flying over, what time the next communication pass will be, or what I am doing. Finally, I hear them exiting the airlock and leaving the station. I was taken totally by surprise the first time this happened because it seemed that, no sooner were they out of the airlock, than Yuri was yelling at me to look out the window and start taking pictures. I looked out and there was my commander perched on the end of a very long white pole arcing over the blue and white earth below. Because the station is so big, this pole is used to transport a crew person and payload from one segment to another. It is manually moved by the other crew person. My first thought when I saw this was, "Wow, the future is now. This is real space station work." For a number of years now, I have been seeing artist renditions of what it would be like when the International Space Station is being worked on in a routine manner by astronauts, but this was no artistic fantasy; this was real life. This was the "future" being played out in real time, and I was getting to have a small part in it. How could one person be so fortunate?

Unfortunately, Mir is big and the windows are relatively few, so I can only see bits and pieces of the EVA. After one EVA, when Yuri and Yuri were looking at the video I had taken, they asked why I only photographed

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